Save costs through advance design of pavement renewals
Presenter and author: Greg Arnold – New Zealand
Co – authors: Anthony Stubbs, Graham Mudgway, Bradley West, Brett Kelly

This paper focuses on the advanced pavement design, testing and investigation methodologies for the annual pavement renewals programme in the NZ Transport Agency East Waikato Area Highway Maintenance Contract. Developed from Dr Greg Arnold’s doctorate studies and NZ Transport Agency research conducted in the last 15 years, the design, investigation and performance material testing using Repeated Load Triaxial and Flexural Beam Tests are considered the most advanced in the world in the area of granular and stabilised pavements.

The benefits of this new approach to design and testing has in some cases resulted in a lower cost pavement treatment solution, in other cases the scientific approach used was able to demonstrate to NZ Transport Agency that a more robust treatment was required.

Nick Cook, Senior Network Manager, NZ Transport Agency states: “The innovative pavement design and advance testing method employed by Road Science/Downer as part of the East Waikato Hybrid contract is to be commended. Their design and test methods use an advance process; this has in some cases reduced the funding required for schemes on the East Waikato Contract. … Road Science was able to demonstrate to us that a more robust solution was required.”

While Alan Burkett, Network Maintenance and Operations Advisor, NZ Transport state further: “This is the most comprehensive design and testing process I have seen, which is surprising on a contract that has been squeezed the most in terms of reduced budget.”

Greg is a well recognised pavement design specialist and has led the way in New Zealand in the way pavements are tested and designed. His approach won a 2014 Hirepool Construction Excellence award. He has a Doctorate in Engineering from the University of Nottingham and leads the pavement design team at Road Science.

Determination of the intervention point for rehabilitation of dense graded asphalt wearing courses – the Western Australian experience
Presenter and author: Martyn Glover - Australia

The key to effective asset management of a road pavement is the determination of an appropriate intervention point when replacing the asphalt wear course. An important tool in this exercise is the deterioration curve or prediction model for the pavement’s point of rapid decline in condition.

The sand sub-grades of the Perth metropolitan area in Western Australia provide some of the best road pavement foundations in the world. When combined with Perth’s Mediterranean climate without any freeze/thaw it is considered that these road pavements have much longer life spans than roads elsewhere in Australia and the world.

The published deterioration models for road pavements and the wear courses from around the world have been traditionally used in pavement management systems that are available in Western Australia but in most cases they do not reflect the actual deterioration of the pavement.

This paper presents the final findings of a significant study in the Perth Western Australia which develops the deterioration curve based on over 10,000km of pavement monitored in some cases for in excess of 100 years and reconciled against recent ARRB pavement testing.

Martyn career in public works engineering spans over 37 years and has been predominantly in the areas of engineering, asset management and waste services. Martyn is an engineer who has worked predominantly in Local Government prior to his most recent position as General Manager.
with Roads2000, an asphalt production and civil construction company. He is a Fellow of the Institute of Public Works Engineering Australia, and a member of Engineers Australia and the Local Government Managers Association. In the commercial world Martyn is Deputy President of the Wanneroo Business Association. Martyn has recently embarked on a Doctorate of Philosophy with Curtin University related to the asphalt paving industry and this paper presents the findings of his PhD.

Establishing a large scale noise reducing pavement network by evaluating the effectiveness for inhabitants – case study from the City of Helsinki
Presenter and author: Ville Alatyppö - Finland

As a result of the evaluation of environmental noise, an estimated one third of the inhabitants in the City of Helsinki become exposed to noise exceeding 55 dB(A). Therefore, effective noise reduction methods must be directly applied before 2020. In an entirely new residential environment, low environmental noise could be reached by city planning. In the constructed areas, other noise reduction methods are needed. For example, noise reducing walls are very effective but require a lot of space and are very expensive to construct and maintain. These methods do not affect the source of noise and walls do not decrease noise anywhere else than behind the item itself. Therefore, noise reducing asphalt pavements constitute one very reasonable method for city streets, even though the noise reducing effect is lower compared to the walls. Weather circumstances, high traffic volume and especially studded tyres make the use of noise reducing pavements more difficult than in Central Europe. Therefore, in Finland a noise reducing pavement decreases noise from tyres (CPX-method) by about 3-4 dB(A).

The City of Helsinki carried out an evaluation project where the effectiveness of noise reducing pavements was evaluated using a given mathematical method. The aim was to achieve a network which would help in the decision making where the real benefit could be obtained by using noise reducing pavements.

One of the results was that only in 16 % of the streets of Helsinki even satisfactory benefit could be reached by using noise reducing pavements. The pavement network of the evaluation project could not be directly applied to practice. The present planned network consists of 39 different street sections, with an average length of 840 metres. The network contains 3 different classes of street, where certain types of noise reducing pavements could be used. One idea is to start a 20 years’ service contract for this network. The contract includes as requirement for a pavement a certain noise reducing level when inhabitants reach the best benefits.

Ville is Director of the Maintenance Unit.

The next generation of pavement and surfacing forward works programming
Presenter and author: Adam Humphries – New Zealand

The New Zealand Transport Agency is implementing One Network Road Classification (ONRC) and Network Outcome Contracts (NOC) throughout New Zealand for State Highway maintenance. As part of these contracts, suppliers are implementing and refining collaborative processes to test and challenge the location, timing and treatment of proposed surface and pavement renewals in the Forward Works Programme (FWP). This paper has been developed to enable and assist Local Authorities in adopting some of the NOC philosophies, mechanisms and processes. A risk-based multi-criteria analysis framework methodology for prioritising sites within a 3 to 5 year work programme is outlined. The objective of the methodology is to provide decision makers with confidence that the detailed renewal programme (reseals and rehabilitations) only targets sites in genuine need and achieves the best effect from a given fixed Long Term Programme (LTP) or base funding level. Key features of the methodology include:

- Undertaking detailed ‘all-defects’ inspections to capture a full picture of required maintenance and fault progression.
• Segmentation of the network into 100m sections for prioritisation and ranking which essentially acts to challenge treatment length extent.
• Undertaking failure mode analysis to determine root cause and hence select appropriate repairs (including preventative measures) which address the source of the problem.

Risk-based decision making, founded on full and robust data, occurs throughout the programming process. The objective of the programming methodology is to ensure least whole of life cost solutions; the resulting outcomes include:
• A reduction in future renewals budget demand by more refined intervention strategy and treatment selection.
• Improved certainty around customer levels of service arising from appropriately targeted work.

Adam’s principal responsibility is to support Fulton Hogan’s bids for NZ Transport Agency Network Outcome Contracts. Adam is also involved with developing and implementing new systems and asset management processes as part of the Network Outcome Contracts. Previously Adam has held contract management roles in delivering Local Authority and also NZ Transport Agency State Highway Hybrid contracts.

Delivering a cost-effective skid resistance strategy for a roading network
Presenter and author: Simon Hunt – New Zealand
Co-author: Chris Pacey

Road safety is a significant risk to a road controlling authority, especially if the condition of its assets contributes directly to accidents. One of the key contributors to road safety is the road surface. Funding is tight, so we need to develop a cost-effective skid resistance strategy for the roading network based on a risk-based approach.

The following describes the steps to achieve this:
• Determine and agree skid demand based on the road controlling authority’s relevant documents.
• Split the roading network into Skid Assessment Lengths (SALs) based on risk, using NZTA’s T10 Specification Site Categories.
• Develop a prioritised ranking system to determine the SALs with the highest risk of a surface-related accident.
• Determine the skid resistance testing regime based on the prioritised ranking of the SALs, the road classification and the number of wet-weather surface-related crashes.
• Develop a suite of cost-effective treatments, based on performance.
• Develop a Resurfacing Treatment Selection decision flowchart.
• Develop treatment programme, including temporary solutions.
• Develop and implement a monitoring programme to improve the Skid Resistance Strategy.

This process demonstrates how the development and implementation of an actual strategy delivers a cost-effective, risk-based prioritised skid resistance works programme tailored to the Client’s budget.

Simon has been involved in roading engineering with a particular focus on asset management for over 30 years. This experience has been in a wide variety of roading types - State Highways, and local authority and forestry roads, both in New Zealand and South East Asia involving sealed and unsealed roads. Simon’s areas of expertise include the development of road asset management strategies, road surfacing safety, forward works programming and value for money models. Currently, Simon is Asset Manager for Fulton Hogan.
**Rebuilding flood damaged roads in south east Queensland in the middle of the coal seam gas expansion/explosion. A local government’s experience and learnings**
Presenter and author: David Pemberton - Australia

Local Government in Queensland, Australia over the past few years has been subjected to some of the most challenging engineering and infrastructure management issues ever encountered.

Commencing in 2010 through to 2014 Queensland has been subjected to Flooding Disasters costing $13.6B in repairs. While the flood events were occurring, the state was also undergoing gas explosion with the development of the CSG - Coal Seam Gas Exploration and Development Boom in South West Queensland. Coal Seam Gas supplies 27% of the nation’s reserve and is expanding.

This paper provides an overview of some of the challenges that Local Government has faced in repairing its Roads Infrastructure, whilst negotiating and accommodating the significant increased demand, impact and access on its roads caused by the CSG Gas Industry at the same time.

Managing these complex challenges required a team that was committed and competent in delivering projects, contract and service in a proactive, positive and collaborative way.

This paper presents the systems and processes that were established in meeting these challenges and shares some experiences, highlights and learnings to apply for the future. Simplicity is the key and good relationships are pivotal. Sharing the experiences and lessons learned helps everyone plan for a better and brighter future.

David is Director with LogIT Solutions that has been engaged by Western Downs Regional Council to Program Manage and assist in establishing, implementing and delivering the Major Project Works resulting from the Flood Reconstruction Damage of from 2010-2014 & the Resource Industry Expansion across SW Qld.

David was born in Hamilton NZ; commenced work as a labourer in the family contracting business and has progressed through to a Director of Engineering within Local Government. David has over 30 years of experience in Project Management, Design & Contract Management in Civil Engineering and Local Government.

Dave is a "grass roots deliverer" ("one of the flock" - kiwi terms), enjoys challenges, a laugh or two and loves to get the job done.

**Mine affected roads network plan**
Presenter and author: Neil Pope - Australia
Co-author: Keith Blackmore

Muswellbrook is at the heart of a major coal resource and a number of large mines have developed and are expanding.

Previous road planning has been informed by the 1997 Western Roads Strategy, and via reactive analysis to each application. The EIS generally have failed to capture the impacts on a network level. The 1997 Plan was becoming less relevant as mining investment plans have changed. Several major proposed road deviations caused the plan to be reviewed.

This paper will explain how Council has devised a strategic approach and engaged with the State Government and four major mining companies as funding partners to develop a strategic plan and funding strategy to inform the planning and road management for the next twenty years. They have engaged consultants Cardno to provide the technical work.

The work involves comprehensive analysis of the Mine Affected Road Network:
- Mine Plans;
- Traffic Modelling including origin and destination surveys;
- Network Planning;
- Traffic and Economic analysis of options;
• Implementation Strategy; and
• Funding Plan

Neil has been a Local Government Engineer since 1979

608 Rebuilding Kaiapoi – The ongoing journey
Jeanette Ward – New Zealand

Following the September 2010 and February 2011 Canterbury earthquakes the town of Kaiapoi and the nearby beach settlements were left with extensively damaged infrastructure. The Waimakariri District Council embraced the opportunities that the rebuild offered, these included revitalising streets and seeking innovative, resilient and sustainable water supply, sewer and stormwater outcomes. The community was taken on the rebuild journey through an extensive and inclusive consultation. Later in 2011, with contractors ready to commence work, approximately 1000 properties in Kaiapoi and Pines Beach-Kairaki were zoned ‘Red’ by the Canterbury Earthquake Recovery Authority (CERA). CERA deemed it was not economic to rebuild on this land in the short to medium term.

The land rezoning meant that much of the proposed infrastructure required reconsideration including existing road access options and proposed street designs. These options then impacted on the water, sewer and drainage designs. A revised strategy was developed for each infrastructure type, these needed to address major uncertainties such as the future use of the Red Zone land and funding. The result was a number of road alignment options and new street designs for continuing consultation.

This continues the story of the Kaiapoi rebuild and challenges facing the team of engineers dedicated to helping this community rebuild and achieve more sustainable outcomes.

Jeanette is a Chartered Civil Engineer with 20 years of diverse engineering experience gained in both the UK and New Zealand. Her specialities are transport planning, traffic engineering/design, project management and streetscape design. Over the last few years Jeanette Ward has been significantly involved with earthquake rebuild projects throughout Christchurch city and Waimakariri District. She is always eager to share this experience given the challenges and learnings along the way. Jeanette regularly presents at conferences and at the 2013 IPENZ Transportation Conference was awarded the overall best presentation award.

609 The use of modern data collection technologies to inform the development of a traffic model and asset management plan for Palmerston North
Presenter and author: Alan Kerr – New Zealand
Co-author: Simon Cager

Palmerston North City Council have recently commissioned a new traffic model to cover the City and surrounding area. The intention is that this model will be used to assess the performance of the road network now and in the future. It will be used to assess new infrastructure as well as land use and policy changes. It will also be used to assess the City’s Asset Management Plan (AMP)

As part of the model development, the Council (supported by Beca) used a range of modern data collection techniques to understand current traffic patterns around the city. This included the use of Fleet GPS data and Bluetooth data. Both techniques have proven to be a very cost effective means to collect large volumes of data, and the Palmerston North model was the first in New Zealand to use these techniques extensively. Council is also using some of this data to inform signal operations around the City.

Simon and Alan will provide a bit of background to the study and the technology adopted before demonstrating the value that can be gained from applying these techniques across a variety of contexts.
Alan is an experienced transport planner with particular expertise in major event planning and crowd modelling, but he is also experienced in many broader transport planning areas such as development planning, traffic modelling, demand forecasting, congestion charging appraisal, economic analysis, accessibility and mobility planning, and journey time variability research.

**Development of forward works program and prediction of deterioration rates on unsealed roads**  
Presenter and author: Justin Weligamage - Australia  
Co-author: James Erskine

For most rural road agencies the unsealed road network is by length the biggest road asset and has the highest maintenance requirements. Developing sound strategic planning for this asset is vital to ensuring community access to rural and isolated locations is maintained. This paper looks at the strategic use of the data captured as part of the comprehensive survey recently completed on the Toowoomba Regional Council (TRC) unsealed road network. The data which included gravel depths and material type along with gravel depths, geometric profile, condition, and drainage/shoulder status was used to develop an Unsealed Condition Score (UCS) that was used to establish a priority with which works could be ordered. Subsequent annual condition data collected on the higher order roads across the network has been used to examine and provide initial deterioration rates of the unsealed road performance.

The collected data was used to trigger works activities appropriate for the local conditions of each road segment and backlog of work was determined where the condition of the unsealed road network did not meet the Levels of Service. A three year program to address this backlog was developed based on the UCS. In order to project and justify long term investment needs of the unsealed network it is necessary to understand the deterioration rates for the condition parameters that trigger the works activities. Condition data collected from the second survey and utilised in this study will be combined with additional survey data to be collected in future years to improve the confidence of the deterioration rates and predictions made from this data.

Justin is currently a Principal Engineer (Asset Management) with Toowoomba Regional Council, in Australia. He has over 25 years of consulting, research and industry experience in the areas of road and civil infrastructure. Over this time Justin developed and implemented road asset management initiatives, including the publication of “Asset Maintenance Guidelines” and “Skid Resistance Management Plan”, the strategic application of the Highway Development and Management System (HDM4) for the Queensland Department of Transport and Main Roads. He has written a number of research papers and technical reports, and has published and presented at various refereed international conferences.

**Moreton Bay rail link — A local Government’s role in state led infrastructure projects**  
Presenter and author: Lindsay McLeod - Australia

With a history that can be traced back more than a century, and with detailed corridor and infrastructure planning spanning decades, the Moreton Bay Rail Link is finally well and truly underway.

For Moreton Bay Regional Council, the outcomes achieved to date with the Moreton Bay Rail Link have re-affirmed the importance of a pro-active, strategic and energetic approach to State and Federal Government engagement, securing funding, planning and management of delivery of major, regionally significant infrastructure projects.

The involvement in the Moreton Bay Rail Link project has provided the opportunity for Council to capitalize on its investment, coordinate the infrastructure delivery with land use planning, ensure transport integration outcomes, promote effective environmental management and mobilize the necessary social and economic growth activities necessary for sustainable regional development.
The paper will outline the Moreton Bay Regional Council’s purpose, role and partnership with the State Government in the establishment and delivery of the Moreton Bay Rail Link project and the benefits of “front loading” the project planning process to ensure multiple regionally significant project outcomes.

Lindsay is the Manager Major Projects at Moreton Bay Regional Council and has over 40 years of experience in the local government civil engineering profession performing infrastructure design, planning, strategic and management functions across the spectrum of local government responsibilities.

Lindsay graduated from the Queensland University of Technology with a Certificate in Civil Engineering and has completed tertiary studies in Traffic Management, Human Resource Management and Business.

As the Manager Major Projects, Lindsay’s key role is managing the planning and infrastructure delivery associated with Moreton Bay Regional Council’s $105M investment in the $1.147B Moreton Bay Rail Link Project.

Sustainable loading of roading networks
Presenters and authors: John Laskewitz & Hartley Hare – New Zealand

The Government has sought to improve transport and economic efficiency through allowing heavier truck and trailer units (HPMV) on as much of the national roading network as possible. This provides the benefit of reducing the number of trucks on the roads for a given freight task and also the number of drivers required at a time of skilled driver shortages.

However, one of the major drawbacks of transporting heavier loads is the potential for a substantial increase in pavement degradation causing network sustainability issues for local authorities such as Southland District Council (SDC) with their 5,000 km network and small ratepayer base.

This paper covers how SDC have sought to balance the benefits of HPMV against the additional costs to its ratepayers. It provides a summary of the consultation carried out with the Heavy Transport Industry and some of the compromises that have been developed which provide substantial gains to the trucking operators without significant adverse effects on the sustainability of the local roading network.

Some of the issues explored include the criticality of the loading distribution over truck and trailer units, tyre sizes and numbers, specific pavement strengths, speeds on sections of road, and changing routes.

John has over 30 years’ experience as a Civil Engineer with the last twenty years specialising in roading. He is MWH Global’s Client Service Manager for the current Southland and Gore District Council transportation professional services contract where he is responsible for delivery by the wider MWH Global team as they help the Councils efficiently manage, maintain and upgrade their infrastructural assets, covering a combined total of 25 townships, 5,850 km of roading and 1,200 bridges.

John has extensive experience in leadership, asset and project management as well as technical expertise on planning and procurement for transportation and roading related projects.

Hartley has 9 years of experience in the roading industry. He is the Roading Asset Management Engineer at Southland District Council, joining SDC in 2011 from MWH Global. With a background in roading design, site supervision and contract administration, his key focus is now the Asset Management of the SDC roading infrastructure network.

Bridges, bridges, bridges…..building bridges of resilience to sustain communities
Presenter and Author: Andrew Johnson - Australia
Co-author: Paul Henderson
Somerset Regional Council is situated an hour west of Brisbane and is the fastest growing local government area in southeast Queensland with a growth rate of 4.2 per cent and home to 23,000 people. The Somerset region has an area of 5,379 sq km with a road network of 3,267km and 102 bridge structures and significantly, holds the key water catchments for southeast Queensland. Council was successful in receiving funds from flood recovery grants for both REPA (restoration of essential public assets) and betterment. With Council’s willingness to contribute to projects, Council has been able to renew or replace over one third of its bridge stock with highly resilient structures to ensure Somerset’s community remains viable with sustainably transport networks.

This paper will focus on how Somerset has delivered a number of projects including 25 bridge projects over the last four years providing sustainable outcomes in the best interest of Community and Council.

Topics include:
- Innovation and/or best practice – A streamlined design process with unique opportunities for innovation within individual bridges. This paper will showcase the 2013 IPWEAQ Award Winning Engineering Excellence Award - Esk Pedestrian Bridge. The Esk Pedestrian Bridge Project demonstrates the ability of engineers to think ‘outside the box’ and incorporate low cost architectural features to capture the historical significance of previous generations and inspire the present and future generations.
- Process and Planning,
- Benefits (Present & Future),
- Whole of life costs,
- Sustainability

Andrew, a Registered Professional Engineer of Queensland (RPEQ), has worked in the civil construction industry for over 25 years and has gained a wealth of experience holding engineering/surveying positions in State & Local Government and private enterprise. Andrew has predominately worked for Local Government and experienced the diversity of working for one of the smallest Local Governments in Australia (Clifton Shire Council) to the largest (Brisbane City Council). He is presently employed by Somerset Regional Council as “Works Manager” where he has served for the last four years. Career highlights include his leadership role in delivering the $150M flood recovery program for the Somerset Region. He holds qualifications in Engineering, Surveying, and Project Management.

614 'Orbit City': A sustainable community? Corridors, collaboration and balancing an international airport in the city of West Torrens
Presenter and author: Angelo Catinari – Australia

Adelaide Airport is unique amongst Australian airports in that it is located very close to the Adelaide CBD. The City of West Torrens is an inner suburban Council abutting the western end of the City of Adelaide. As the largest land holder in the City of West Torrens, what happens at Adelaide Airport would have significant implications on the local community, in terms of amenity, transport, parking and environmental impacts.

Passenger numbers at Adelaide Airport have almost doubled in the past 16 years. International patronage has more than tripled. In 2013, Adelaide Airport was Australia’s...
fastest growing capital city airport. On top of that growth, non-aviation developments have taken off in a big way. How do you deal with the impact of these large scale developments on the local area?

This paper focuses on the transport aspects and discusses the ways in which the City of West Torrens has worked collaboratively with Adelaide Airport Ltd, the wider community and other key stakeholders in managing transport issues.

While Adelaide Airport is the primary focus of this paper, it is the process adopted in managing the impacts of such a large scale development that will be explored.

Angelo has over 17 years’ experience in civil and public works engineering. Since graduating from the University of South Australia he has been an active and prominent figure in the advancement of the public works profession. Angelo has been involved in many leading industry groups including the Institute of Public Works Engineering and has served as a Director at State and National levels, State President 2010-2012 and was awarded the National Emerging Leader in 2009. Angelo has headed teams in delivering a range of diverse infrastructure projects, programs and strategic documents, ensuring community involvement and acceptance. More recently his work has focused on Local Government Management. Angelo is currently a General Manager at the City of West Torrens.

**Using road benchmarking to report on the status of council’s road assets**

**Presenter and author: Timothy McCarthy - Australia**

Given the value of assets owned by councils and the direct and indirect expenditure, the lack of reporting to the executive, Council and the community in NSW is simply not clear enough. The Roads Benchmarking Program is an important tool in developing appropriate reporting on road assets.

There are numerous approaches to managing road assets. With no right or wrong answer on what expenditure and valuations should be, a benchmark figure can give local government’s accurate and credible information to assist work practices, methodologies and processes. Morrison Low and Xyst have recently completed the 2014 Yardstick Roads Benchmarking Program across Australasia. The Program consists of comparing information on each of the councils’ road corridors, focussing on asset and financial information. Councils submit details on current assets, depreciation values and expenditure, along with their demographic information. The paper will discuss what level of reporting on road assets is appropriate and how the benchmarking helps provide an overall picture of a council’s road assets. The paper will also cover key learnings from the program and demonstrate the indicators and measures that provide meaningful reporting that can be easily understood, yet give a true indication of the state of the assets for each council.

Tim is an experienced council engineer with significant expertise in asset management, project delivery processes, maintenance operations and contract management. His particular focus has been on sustainable asset management practices in councils and he has hands-on knowledge of how a wide range of councils go about asset management and the link between assets, operations and financial management. Tim has tertiary qualifications in engineering, management and law and is NAMS accredited

**Real-time street information**

**Presenter and author: Kari Vuorinen - Finland**

Data collection in field with mobile devices taking advantage of back office information is base for the next step in visualizing the collected data in real-time. The information on how and where, and how extensive our operations are in the field have not been possible to present a simple way, until now.

Data can be collected and shared forward to other systems using interfaces, as well as local residents through public maps and to developers through open data.
Large amounts of data can be visualized in an easily understandable form using the geographic data as a base for map-based user interfaces. Data has features such as location, ID and timestamp. For example, the gathered mobile workforce progress and status information in supervision of parking or excavation works or street maintenance can be used to help manage employees efficiently. For different tasks, there are different views in the real-time map.

In situation awareness maps, the data is shown as color-coded shapes on map designs or in the form of spheres. Color changes from green to red in defined intervals when time elapses. The final result is real-time street supervision information for everyone.

Kari has been working for the city of Helsinki from 2006 first as an ICT-specialist and from 2010 as process manager for public works department.

Road safety and traffic management - National War Memorial Park and Arras Tunnel
Presenter and author: Ryan Dunn – New Zealand

On 7 August 2012, the Government announced a new project to underground Buckle Street, a section of State Highway 1 in central Wellington carrying some 25,000 vehicles per day. The aim was to create a new, unified National War Memorial Park that will be a major focal point for New Zealanders to commemorate the 100 year anniversary of the Gallipoli landings in April 2015 and beyond.

With a short timeframe and strict deadline, the challenge of designing and constructing a 300m long reinforced concrete tunnel structure, and construction of the Pukeahu National War Memorial Park above became the responsibility of the Memorial Park Alliance team consisting of the NZ Transport Agency, Downer, HEB Construction, Tonkin and Taylor and URS (AECOM).

This paper provides an insight into the management of multi-modal transport needs around a central city construction site. This paper describes how the Alliance went beyond the norm in all areas of environmental management, pioneering new methods to monitor effects on pedestrians, cyclists and motorists, which in turn enabled a focus on areas where improvement would be valued by the public, thus creating an environment where the public came to love temporary traffic management.

Ryan Dunn is a Senior Transportation Engineer for Tonkin & Taylor with 10 years’ experience in Traffic Engineering and Transportation Planning. His work has involved providing specialist technical advice for the design and assessment of a diverse range of roading and infrastructure engineering projects, with project experience covering feasibility studies and scheme assessments, as well as detailed design and construction supervision. Ryan has worked for a wide variety of clients including Local Authorities, NZTA and private developers and has gained expertise in many aspects of Civil Engineering.

Ryan is responsible for the Traffic Design and Temporary Traffic Management for the Memorial Park Alliance who delivered Pukeahu National War Memorial Park (the Government’s major project to commemorate the First World War) which required State Highway 1 to be put underground in a “cut and cover” tunnel in central Wellington.

With his experience of managing multi-modal transport needs around a central city construction site, Ryan will share his perspective on how the Alliance went beyond the norm. Pioneering new methods to monitor effects on pedestrians, cyclists and motorists enabled a focus on areas where improvement would be valued by the public. This created an environment where the public came to love temporary traffic management and enabled the building of the Pukeahu National War Memorial Park in time for ANZAC Day 2015.
**Reducing highway operating speeds through layout treatments**  
Presenter and Author: Jamie Povall – New Zealand

Manakau and Ohau townships are located on SH1 between Otaki and Levin around 80km north of Wellington. Despite a level of frontage activity and small communities in both townships, the 100km/h limit for SH1 in this locale is maintained through the entirety of both townships. There is a desire to implement a reduced 80km/h speed limit through both townships as a result of a poor crash history and to provide benefits for the local community (e.g. reduced severance). Given the long straight and relatively flat alignments, a speed reduction in isolation is unlikely to be effective. Therefore, a new approach is being proposed where an element of lateral shift is combined with vertical relief measures (such as planting and median islands) and subtle narrowing to achieve speed compliance. The projects are expected to deliver significant crash reduction benefits (and community satisfaction) with only moderate levels of expenditure. This paper will explore the basis for the design of the improvements together with the observed effectiveness of the completed projects on the ground.

Jamie is the Transportation Group Team Leader for MWH Global in Christchurch. He regularly leads various transportation projects across all stages of investigation and design for a wide variety of clients.

**Data generation using Monte Carlo simulation for reinforced concrete highway bridge defect of BIMs**  
Presenter and Author: Wan Safizah Wan Salim - Malaysia  
Co-authors: Mohd Shahir Liew, A'fza Shafie

Overall, there are more than 10,000 bridges in Malaysia managed by a few authority bodies. Since there are a huge number of bridges to observed, it will contribute to the issue on the inspection and maintenance cost which must be given priorities during the decision making process. Thus, it is important to have a comprehensive system in managing the bridge performance assessment by proposing the framework of structural integrity management system for reinforced concrete highway bridge, namely BIMs. This proposes system is using risk-based approach which may be emulated from SIMS of offshore platform structure. Generally, the objectives of this study are to identify the bridge performance indicator in term of cause-consequence scenario in order to develop the framework of risk-based bridge management system and to create the risk matrix for prioritizing the inspection for maintenance. The evaluation part of the propose system is focuses on the development of bridge defect model for the determination of probability and consequences of bridge failure through fault tree and event tree method. However, this paper only addresses the application of Monte Carlo simulation in generating data that causes the bridge defect which associated with the basic event of developed fault tree model.

Having bachelor degree (honors) in Civil and Structural Engineering from University Kebangsaan Malaysia and Master of Science (Structural Engineering) from University Sains Malaysia. Currently, PhD candidate with Department of Civil Engineering, University Technology PETRONAS, Malaysia on leave from Faculty of Civil Engineering, University Technology MARA, Malaysia. Working as Senior Lecturer at University Technology MARA, Malaysia

**The influence of road design speed, posted speed limits and lane widths on speed selection**  
Presenter and author: Jason Deller - Australia

Drivers select the speed at which they travel as a function of a variety of driving clues and risk assessment, directly affecting the operating speed of that road. Resulting speed distributions are routinely used to justify posted speeds. Operating speeds are fundamental to the development of any roadway corridor and are used to determine appropriate roadway design elements. The literature reveals that the effects of narrower cross-sections to lower
traffic speeds, and associated crash frequencies, have been inconsistent and there has been insufficient research in urban areas to accurately understand their impacts on speed selection (distributions) and associated design and posted speeds. This paper outlines a program of study which will be undertaken to examine the relationship between roadway design parameters and speed selection among drivers using a driving simulator and observational study implemented in Redlands. By extension it will assist in refining the road design process and provide an opportunity to improve the determination of posted speed limits, with the intent to promote safer speeds based on evidence.

Jason is the owner of the traffic and transport planning consultancy “Engineering Your Life”, Jason is a PhD scholar and optimistic transport futurist with a passion for sustainable transport, road safety and personal growth.

3.1 High quality management public space in the Netherlands
Presenter and author: Jeroen Verhagen - Netherlands

The public space management, which includes road management, is being carried out according to the High-Quality Management strategy [in Dutch: Beheren Op Niveau, or BON].

BON contains a framework for public space management. It clearly indicates the quality level and costs with which we should maintain public spaces, which are divided into roads, public green spaces, other street furniture, etc.

The presence and quality of public spaces plays an important role for many other aspects of society. A well-designed and well-maintained public space contributes to the quality of life and economic well-being of a community.

We start the High-Quality Management framework (BON) because there weren’t any clear agreements about the quality level needed to maintain public spaces* and there wasn’t enough budget, particularly for road maintenance**.

Studies show that citizens and politicians highly value well-maintained, clean and safe public spaces. To be able to ensure the public spaces would meet these needs and to solve the maintenance problems mentioned previously, we started the BON project, a model that was designed in-house by us, which involved creating descriptions of the quality of the public space and then working out the cost of getting to this desired level of quality.

* Before the introduction of BON, the management in Etten-Leur, as in many municipalities in the Netherlands, had grown without following a specific framework. Decisions about maintenance works were based on the budget available, also known as budget-led management. When the money ran out, the maintenance works would simply not be continued.

** We realised that the budget made available for road maintenance was absolutely insufficient. As the years went by, damages to the roads were increasing much faster than we could afford to repair on the budget available at the time, and this situation was getting worrying.

Jeroen has since 2003 been head of the Department of urban management of the municipality of Etten-Leur (42,500 inhabitants). Etten-Leur is situated between Rotterdam and Antwerp, is a medium-sized municipality with a surface of 56 km², has a fairly compact core and a vast outdoor area. Because of the diversion of the highway A58 that formerly was situated in the centre of Etten-Leur, we have developed during the recent years a complete new city centre. The Department of urban management main task is the maintenance of the public area. This includes the maintenance of roads, drains, public green, the public lighting, sport parks, in- and outdoor swimming pool and ice-rink, cemeteries, etc.

3.2 Integrating performance measures into States’ transportation planning process
Presenter and author: Matthew Hardy - USA
Moving Ahead for Progress in the 21st Century Act (MAP-21) requires State DOTs and metropolitan planning organizations (MPOs) to establish and use a performance-based approach as part of the statewide and metropolitan transportation planning process. The performance-based approach must be used in transportation decision making to support seven national goal areas established within MAP-21. The United States Department of Transportation will establish performance measures and each State DOT will be required to establish performance targets associated with each performance measure for use in tracking progress toward outcomes. MAP-21 requires that State DOTs and MPOs engage in an approach referred to as Performance-based Planning and Programming (PBPP) which integrates performance management concepts into existing federally-required transportation planning and programming processes.

An important aspect of PBPP is the use of performance measures and how these measures get integrated into a state's long-range transportation plan (LRTP). In fact, MAP-21 requires state DOTs to integrate the national-level measures into both their long-range plans and short-term transportation improvement programs. In both cases, State DOTs must describe the performance measures and targets used in assessing transportation performance and then document progress in achieving the performance targets. While the use of performance management principles is not new to state DOTs or many MPOs, the required enhanced connection between the performance measures and long-range plans is a new aspect. The methods that underpin incorporation of performance measures into the long-range planning process remain far from exact. However, a few states have started to develop data, tools or procedures that allow them to integrate performance measures into planning and decision-making across modes or outside core areas such as highway preservation. This paper will present three case studies of how State DOTs are beginning to implement the PBPP requirements into their transportation planning process.

Matthew, Ph.D. is the Program Director for Planning and Policy at the American Association of State Highway and Transportation Officials (AASHTO). In this capacity, he supports a number of technical committees related to transportation planning, transportation asset management, and transportation performance management. In addition, he helps develop AASHTO transportation policy related to planning and performance management. Matt has been with AASHTO for four years. Prior to AASHTO, Matt worked in the private sector on various projects including transportation planning and policy analysis, modeling and simulation, work zone analysis, evacuation planning and operations, and mileage-based user fees. Matt holds doctorate and master of science degrees in public policy along with an undergraduate degree in civil engineering. Matt is married with two children and lives in Falls Church, VA. He is an avid percussionist and home improvement enthusiast in his free time.

Creating sustainable unsealed roads by continuous compaction with grader attached rollers
Presenter and author: Paul Herbison – New Zealand

Compaction of roads during construction is nothing new, though we seldom compact unsealed roads when maintaining them. The results of continuous roller compaction are quite dramatic with up to 50% reduction in aggregate usage and grading frequency. This can have a dramatic effect on a whole network, by being able to spend that money in other areas, especially so in current tough financial conditions.

The key is sealing the road surface so it reduces moisture sensitivity of the unsealed road. During wet periods water can run off the compacted surface to the drainage swale rather than soaking into the pavement compromising shear strength and resistance to rutting and potholing. During dry periods also it reduces moisture loss during maintenance grading by sealing the road surface up behind the grader preserving the moisture in the road pavement.

Additional benefits are a reduction in complaints, dust, potholes, rutting, and scouring. Case studies from Kaipara, Central Otago, and Dunedin District Councils and Fiji will be presented outlining points of interest and the results of continuous compaction via grader attached rollers over the past 5 years.
Born (1962) in a small rural town in New Zealand, Paul grew up on local country roads many unsealed. Building roads became a career choice and Paul has spent 30yrs in Civil Engineering. Spanning number of countries; New Zealand, Australia, China, Fiji and the United Kingdom. This includes a number of years tendering large projects up to 2bn in NZ and Australia. Ranging from building 15km of new motorway, 30km of highway, major earthworks projects, in excess of 3M m2 of stabilisation sealed and unsealed, managing local council networks. Paul has a passion for unsealed and sealed pavements.